PORTABLE SUBMERSIBLE PUMP

The present invention relates to a portable submersible pump in which the impeller unit is within the liquid to be pumped, while the motor unit is located outside the liquid in a dry area.

It is an object of the present invention to provide a split function submersible pump which permits a motor selection from a wide range of motor types.

Another object of the present invention is to provide a portable submersible pump that can be manufactured at a smaller cost than other pumps of this type that are currently available.

It is a further object of the present invention to provide a submersible pump which is not restricted to an electric power source but may utilize as a power source any device capable of producing sustained circular motion.

A major object of the present invention is to provide a flexible power transmission line between the separated motor and impeller units of the pump thereby permitting the easy adaptability of the portable pump to different locations as well as locations that may be inacessible to known submersible pumps.

Another object of the present invention is to provide a submersible pump which can be adapted to accomodate a reduction gear box or a clutch. The use of a clutch with the present device can eliminate any undesirable stresses caused by the motor starting torque.

A further object of the present invention is the ability to reduce the size of the pump so that it is comparatively small aend easy to transport.

It is another object of the present invention to provide a portable submersible pump which is reliably effective for the purposes intended.

The invention will now be more fully described with reference to the accompanying drawings wherein:

FIG. 1 is a side elevational view of the entire assembly of the portable submersible pump constructed according to the teachings of the present invention.

FIG. 2 is a partial sectional and side elevational view of the flexible shaft connecting the motor and the impeller of the pump.

FIG. 3 is a side elevational view of a slightly modified construction of the present invention.

FIG. 4 is a side elevational view of another modification of the present invention.

FIG. 5 is a partial sectional and a partial side elevational view of a portable submersible pump of the volute type.

FIG. 6 is a sectional view of the pump having a strainer to limit the intake of solids therein.

FIG. 7 is a sectional view of a modification of the present invention in which the impeller and pump units are connected directly to the flexibl shaft.

FIG. 8 is a partial sectional and a partial elevational view of some of the details of construction of the flexible driving shaft and its coupling means.

FIG. 9 is a partial sectional and a partial elevational view of an alternative construction of the present invention utilizing an axial flow pump and

FIG. 10 is a bottom plan view of the structure shown in FIG. 9.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. 1 and 2, there is shown a portable submersible pump referred to generally by numeral 14 in which the impeller unit 16 only is submerged in the liquid L. It will be noted that the motor unit 24 is not in the liquid environment but is mounted a distance away from the impeller 16 on dry land.

The power transmission between the motor unit 24 and the impeller unit 16 takes the form of a flexible drive shaft referred to generally by the numeral 18. A discharge hose 22 is shown for evacuating the liquid handled by the impeller unit 16 of the submersible pump 14. A coupling 32 couples discharge hose 22 to the discharge conduit extension 34.

Connected between the flexible drive shaft 18 and the impeller unit 16 is a mechanism 26 such as gears or a hydraulic system (not shown) that is operative to increase or reduce the torque or RPM, as required. At the other end of the flexible shaft 18 a device 28 can be connected between the flexible shaft 18 and motor unit 24 in the form of a clutch, whereby the stresses created by the starting torque of the motor may be reduced or entirely eliminated.

When it becomes necessary to recover a pump from a hole or crevice, a rope or chain 36 is attached at one end to an eyebolt 40 on the housing of the impeller unit 16 while the other end of the rope is secured on dry land. A strainer 42 is attached to the impeller housing in order to eliminate the ingestion of solid particles into the impeller unit 16 with the liquid.

The flexible shaft 18 is shown in greater detail in FIG. 2. In this regard, the flexible driving core constitutes a multiplicity of layers of wire 44 which rotate within a bendable metal, or rubber-covered flexible casing 46. Mounted on the ends of the casing 46 are ferrules 48 and fittings 49 which attach to terminals (not shown) for the drive shaft 18.

FIG. 3 shows a slightly modified construction of the present invention in which the flexible shaft 52 and the discharge hose 53 are secured together by means of clamps 54. Moreover, the impeller housing is provided with hinged legs 51, for elevating the housing from the surface beings pumped, if desired. A handle 55 is shown for ease in transporting the pump from one location to another.

As seen in FIG. 4, an exterior sheath or cover 58 may be installed on the impeller housing 59 by means of an annular flexible belt or clamp 62. This arrangement creates a unitary construction of the pump impeller unit 59, discharge hose 60 and flexible shaft 61. The sheath 58 is of a strong durable material such as rubber, plastic or canvas. It can be readily seen that this construction permits the recovery of the pump by means of gripping the sheath 58 and lifting, thereby eliminating a device such as a chain or rope 36 as seen in FIG. 1.

FIG. 5 illustrates a portable submersible pump of the volute casing type which is desirable for use under conditiosn where there is a high percentage of solids in the liquids. The reference numeral 64 refers to the volute casing which is provided with a pump housing bottom 66 secured thereto by means of bolts 77. A bearing support 65 is secured to the volute casing 64 by bolts 76. The casing 64 is furthermore provided with a pump stand 68. The impeller 71 in the volute casing 64 is connected through a discharge hose 78. The bottom of casing 64 is provided with a pump intake opening 81. The rotating centrifigal pump impeller 71 is driven by an impeller shaft 72 rotatably mounted in bearing 73. The